

Amendments to the Claims

The following Listing of Claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (canceled)

2. (currently amended) A computer-implemented method of detecting an edge in a digital image block, the method comprising:
deriving blocks of image values from an image;
for each of one or more of the blocks,
creating-determining a respective histogram of pixel luminance-image value
differences in the block;and
computing a respective entropy value of from the respective histogram, and
based on the respective entropy value producing a respective result identifying the
block as either an edge-containing block or a non-edge-containing block;
and
performing at least one operation on the image based on the respective results produced
for ones of the blocks.

3. (currently amended) The method of claim 2, wherein for each of the one or more blocks the computing comprises retrieving variable values of an entropy function from a lookup table containing a mapping between values of the respective histogram and the variable values, and evaluating the entropy function based on the retrieved variable valuesentropies for bins of the histogram are pre-computed and stored in a lookup table; and wherein the lookup table is used to determine the entropy of the histogram.

4. (currently amended) The method of claim 3, wherein entries of the variable values in the lookup table are scaled and rounded to integers.

5. (currently amended) The method of claim 2, further comprising for each of the one or more blocks determining a respective range value corresponding to a maximum pixel difference of image values in the block.

6. (currently amended) The method of claim 5, wherein the producing comprises for each of the one or more blocks producing the respective result based on a comparison of further comprising comparing the respective entropy value to a first threshold and a comparison of the respective range value -maximum difference- to a second threshold-thresholds-to-determine whether the block contains an edge.

7. (currently amended) The method of claim 5, wherein the producing comprises for each of the one or more blocks producing the respective result identifying the block as an edge-containing block in response to a determination that the respective entropy value corresponds to a low block entropy and the respective range value corresponds to a block-containing edges is identified by a low entropy and a high block range-maximum difference.

8. (currently amended) The method of claim 5, wherein the producing comprises for each of the one or more blocks producing the respective result identifying the block as a non-edge-containing block in response to a determination that the range value-the block is identified as not having an edge if the maximum difference is zero.

9. (currently amended) ~~A method of detecting an edge in a digital image block, the method comprising determining an entropy~~The method of claim 2, wherein the producing comprises for each of the one or more blocks determining the respective entropy value based on an entropy function E(h) represented by according to the function

$$E(h) = \log(T) - \frac{1}{T} \sum_{h_n \neq 0} h_n \log(h_n),$$

wherein T is a total area of the respective histogram h, and h_n is a value of a bin n of the respective histogram.

10. (currently amended) The method of claim 9, wherein the producing comprises for each of the one or more blocks determining the respective entropy value from a normalized version of the entropy function $E(h)$ is normalized.

11. (canceled)

12. (currently amended) Apparatus ~~for detecting edges in an image block, wherein the apparatus includes comprising:~~

a memory; and

a processor coupled to the memory and operable to perform operations comprising for creating a histogram of pixel luminance differences in the block; and computing entropy of the histogram

deriving blocks of image values from an image,

for each of one or more of the blocks,

determining a respective histogram of image value differences in the block,

computing a respective entropy value from the respective histogram, and

based on the respective entropy value producing a respective result identifying the

block as either an edge-containing block or a non-edge-containing block,

and

performing at least one operation on the image based on the respective results produced for ones of the blocks.

13. (currently amended) The apparatus of claim 12, wherein in the computing the processor is operable to perform for each of the one or more blocks operations comprising retrieving variable values of an entropy function from a lookup table containing a mapping between values of the respective histogram and the variable values, and evaluating the entropy function based on the retrieved variable values includes a look-up table of pre-computed bin entropies a function of bin height; and wherein the processor looks up entropies for bins of the histogram and sums the bin entropies to determine the entropy of the histogram.

14. (currently amended) The apparatus of claim 12, wherein for each of the one or more blocks the processor is operable to perform operations comprising determining a respective range value corresponding to a maximum difference of image values in the block~~also determines a maximum pixel difference in the block.~~

15. (currently amended) The apparatus of claim 14, wherein in the producing the processor is operable to perform operations comprising producing the respective result based on a comparison of the respective entropy value to a first threshold and a comparison of the respective range value~~compares the entropy and maximum difference to thresholds to determine whether the block contains an edge.~~

16. (currently amended) The apparatus of claim 15, wherein in the producing the processor is operable to perform operations comprising producing the respective result identifying the block as an edge-containing block in response to a determination that the respective entropy value corresponds to a low block entropy and the respective range value corresponds to a high block range~~identifies a block having low entropy and a high maximum difference as a block containing at least one edge.~~

17. (currently amended) The apparatus of claim 12, wherein in the producing the processor is operable to perform for each of the one or more blocks operations comprising determining the respective entropy value based on an entropy function $E(h)$ represented by~~Apparatus for detecting edges in an image block by determining entropies in the block according to the function~~

$$E(h) = \log(T) - \frac{1}{T} \sum_{h_n \neq 0} h_n \log(h_n)$$

wherein T is a total area of the respective histogram h, and h_n is a value of a bin n of the respective histogram.

18. (currently amended) The apparatus of claim 17, wherein in the producing the processor is operable to perform for each of the one or more blocks operations comprising determining the respective entropy value from a normalized version of uses a normalized version of the entropy function $E(h)$ to detect whether the block contains at least one edge.

19. (canceled)

20. (currently amended) The computer-readable medium article of claim 25, wherein the computer-readable instructions cause the computer to perform for each of the one or more blocks operations comprising determining a respective range value corresponding to a maximum difference of image values in the block program also causes the processor to determine a maximum pixel difference in the block and use the maximum difference to determine whether the block contains at least one edge.

21. (currently amended) The computer-readable medium article of claim 20, wherein in the producing the computer-readable instructions cause the computer to perform for each of the one or more blocks operations comprising producing the respective result based on a comparison of the respective entropy value to a first threshold and a comparison of the respective range value to a second threshold a block containing edges is identified by a low entropy and a high maximum difference.

22. (currently amended) The computer-readable medium article of claim 20, wherein in the producing the computer-readable instructions cause the computer to perform for each of the one or more blocks operations comprising producing the respective result identifying the block as a non-edge-containing block in response to a determination that the range value the block is identified as not having an edge if the maximum difference is zero.

23. (currently amended) The computer-readable medium of claim 25, wherein in the producing the computer-readable instructions cause the computer to perform for each of the one or more blocks operations comprising determining the respective entropy value based on an

entropy function E(h) represented by~~An article for a processor, the article comprising: memory;~~
and

a program stored in the memory, the program, when executed, causing the processor to
determine whether an image block contains an edge by determining an entropy according to the
function

$$E(h) = \log(T) - \frac{1}{T} \sum_{h_n=0} h_n \log(h_n)$$

wherein T is a total area of the respective histogram h, and h_n is a value of a bin n of the
respective histogram.

24. (currently amended) The computer-readable medium article of claim 23, wherein in
the producing the computer-readable instructions cause the computer to perform for each of the
one or more blocks operations comprising determining the respective entropy value from a
normalized version of the entropy function E(h)~~the entropy function is normalized.~~

25. (currently amended) A computer-readable medium for arranging graphic objects on a
page, the computer-readable medium storing computer-readable instructions causing a computer
to perform operations comprising:~~An article for a processor, the article comprising: memory; and~~

a program stored in the memory, the program, when executed, causing the processor to
determine whether an image block contains an edge, the determination including creating a
histogram of the pixel luminance differences in the block; and computing the entropy of the
histogram deriving blocks of image values from an image;

for each of one or more of the blocks,

determining a respective histogram of image value differences in the block,

computing a respective entropy value from the respective histogram, and

based on the respective entropy value producing a respective result identifying the

block as either an edge-containing block or a non-edge-containing block;

and

performing at least one operation on the image based on the respective results produced
for ones of the blocks.

26. (currently amended) The computer-readable medium article of claim 25, wherein in the computing the computer-readable instructions cause the computer to perform operations comprising retrieving variable values of an entropy function from a lookup table containing a mapping between values of the respective histogram and the variable values, and evaluating the entropy function based on the retrieved variable values ~~entropies for bins of the histogram are pre-computed and stored in a lookup table; and wherein the lookup table is used to determine the entropy of the histogram.~~

Claims 27-30 (canceled).

31. (new) The method of claim 2, wherein for each of the one or more blocks the determining comprises determining a respective frequency distribution of magnitudes of differences between ones of the image values corresponding to adjacent image elements in the block.